

MR-J3-10□ to MR-J3-22K□ MR-J3-10□1 to MR-J3-40□1 MR-J3-60□4 to MR-J3-22K□4 MR-J3-DU30K□ · MR-J3-DU37K□ MR-J3-DU30K□4 to MR-J3-DU55K□4 MR-J3-CR55K(4)

Instructions and Cautions for Safe Use of AC Servos

AΗ

MITSUBISHI ELECTRIC AUTOMATION, INC. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A. Tel:+1-847-478-2100 Fax:+1-847-478-2253 MITSUBISHI ELECTRIC EUROPE B.V. German Branch Gothaer Strasse 8, D.40880 Ratingen, Germany Tel:+49-2102-486-0 Fax:+49-2102-486-1120 MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.
No. 1386 Hongqiao Road, Mitsubishi Electric Automation Center, Changning District, Shanghai, Fax: +86-21-2322-3030 MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD.
7F-9F, Gangseo Hangang Xi-tower A, 401, Yangcheon-ro, Gangseo-Gu, Seoul 157-801, Korea
Tel: +82-2-3860-9510
Fax: +82-2-3864-8372/8335

## MITSUBISHI ELECTRIC CORPORATION

IB(NA)0300077-AH(1409)IP Printed in Japan This quide uses recycled paper Specifications are subject to change without notice.

# 1. INTRODUCTION

### 1.1 Introduction to the manuals

If this is the first time for you to use the MELSERVO-J3 Series, read the following manuals before use. Please read them all carefully to use the MELSERVO-J3 Series safely.

Servo amplifier (drive unit) Manual		MR-J3-B (MR-J3-DUB)	MR-J3-B- RJ004	MR-J3-B- RJ006	MR-J3-T	MR-J3-T/ MR-J3-D01	MR-J3-□S	MR-J3-B- RJ080W
MELSERVO Servo Motor Instruction Manual Vol.2 SH(NA)030041	0	0		0	0	0	0	
MR-J3·∐A Servo Amplifier Instruction Manual SH(NA)030038	0		/		/	/	/	/
MR·J3·∐B Servo Amplifier Instruction Manual SH(NA)030051		0	0	0	/	/	/	0
MR·J3·∐B·RJ004 Instruction Manual SH(NA)030054			0		/	/	/	/
MR-J3·UB-RJ006 Servo Amplifier Instruction Manual SH(NA)030056				0				
MR·J3·□T Servo Amplifier Instruction Manual SH(NA)030058					0			
MR·J3·□T/ MR·J3·D01 Servo Amplifier Instruction Manual SH(NA)030061						0		
MR-J3-⊔S Instruction Manual SH(NA)030084			l		l	/		
MR-J3·∐B-RJ080W Instruction Manual SH(NA)030079 (Note)								0

Note. This manual will be created

### 1.2 Contents of the packing

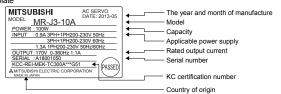
g plate to confirm that the converter unit and servo amplifier (drive unit) you received are

# (1) Converter unit

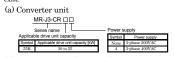
	Contents	Quantity		Contents		Quantity	
	Converter unit	1		Digital I/O connector		1	
	Eyebolt	2		MELSERVO-J3 Series Instruction	s and Cautions for		
	Magnet contactor control connector	1		Safe Use of AC Servos (This guide)	1	1	
2) \$	Servo amplifier (drive unit)						
	Contents Quantity						

Contents	Quantity
Servo amplifier (drive unit)	1
Servo amplifier power supply connector CNP1 CNP2 CNP3 (Note 1)	1 each
CC-Link communication connector CN1 (Note 3)	1
Connection lever for servo amplifier power supply connector (Note 1)	1
Bus bar (Note 4)	2
Eyebolt (Note 4)	2
MELSERVO-J3 Series Instructions and Cautions for Safe Use of AC Servos (This guide)	1
Mounting screw for servo amplifier front cover (M4×14) (Note 2)	1
Mounting screw for servo amplifier cooling fan cover (M4×40) (Note 2)	2
Short-circuit connector CN8 (Note 5)	1

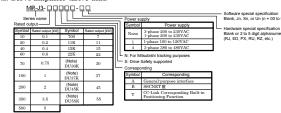
### 1.3 Model code definition



The following describes what each block of a model name indicates. Note that not all the combinations of the symbols



(b) Servo amplifier (drive unit)



# 2. COMPLIANCE WITH THE CE MARKING

### 2.1 What is CE marking?

The CE marking is mandatory and must be affixed to specific products placed on the European Union. When a product conforms to the requirements, the CE marking must be affixed to the product. The CE marking also applies to machine and equipment incorporating servos. When you need a copy of Declaration of Conformity of CE marking, contact your

### (1) EMC directive

The EMC directive also applies to the convertor units and the servo amplifiers (drive units), and they are designed to comply with the EMC directive. The EMC directive also applies the convertor units and the servo amplifiers (drive units)-incorporated machines and equipment. This requires the EMC filter be used with the convertor units and the servo amplifiers (drive units)-incorporated machines and equipment to comply with the EMC directive. For specific EMC directive conforming methods, refer to the EMC Installation Guidelines (IB(NA)67310).

### (2) Low voltage directive

The low voltage directive also applies to the convertor units and the servo amplifiers (drive units), and they are designed to comply with the low voltage directive.

(3) Machinery directive

(3) Machinery directive

Convertor units and servo amplifiers (drive units) is a main component in a machine configuration. Do not allow us the machine unit the machine in which the converter units and servo amplifiers (drive units) are mounted is deed to comply with the machinery directive.

MR-J3·□S servo amplifier is a safety component that complies with the machinery directive.

### 2.2 For compliance

Be sure to perform an appearance inspection of every unit before installation. In addition, have a final performance inspection on the entire machine/system, and keep the inspection record.

Inspection on the entire machine/system, and keep the inspection record.

(1) Converter units, servo amplifiers (drive units) and servo motors used

Use the converter units, servo amplifiers (drive units) and servo motors which standard product.

Converter unit: \( \text{MR-J3-CR55K \ MR-J3-CR55K \ MR-J3-10 \] to \( \text{MR-J3-24K \] \) MR-J3-10 \] to \( \text{MR-J3-40 \] 1

MR-J3-20 \] 4 to \( \text{MR-J3-22K \] \) MR-J3-10 \] 1 to \( \text{MR-J3-40 \] 1

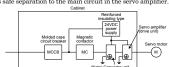
MR-J3-90 \] 4 to \( \text{MR-J3-32K \] \) MR-J3-10 \] To \( \text{MR-J3-DU55K \] 4

Servo motor \( \text{MR-J3-DU56K \] MR-J3-3-DU57K \] \( \text{MR-J3-DU56K \] 4

MR-J3-PU \( \text{MR-J3-PU5-M \ MR-J3-PU5-M \) HC-UP \] \( \text{HC-UP \} \) HC-UP \] \( \text{HC-UP \} \) HR-IP \] \( \text{HR-JP-IP \} \) HF-IP \] \( \text{HF-JP \} \) HF-IP \] \( \text{HF-JP \} \) HF-IP \]

## (2) Structure

The control circuit provides safe separation to the main circuit in the servo amplifier



Note. Servo amplifiers of 22kW or less do not have a converter unit

## (3) Environment

nverter unit and servo amplifier (drive unit) at pollution degree 2 or 1 set forth in EN 60664-1. For

(0)	Environment			
		Item	Environment	
		Operation	[°C]	(Note 2) 0 to 55
	(Note 1)	Operation	[°F]	32 to 131
	Ambient Temperature	Storage, Transportation	[°C]	—20 to 65
		Transportation	[F]	-4 to 149

		Environment
Ambient Humidity	Operation, Storage, Transportation	90% RH or less
Maximum	Operation,Storage	1000m or less
Aititude	Transportation	10000m or less
	Humidity	Humidity Transportation  Maximum Operation, Storage Altitude

Note 1. Ambient temperature is the internal temperature of the cabinet.

2. The servo amplifier 200V 3.6KW or less and 100V 400W or less can be mounted closely. In this case, keep the ambient temperature within 0 to 45° (32° to 113°)" or use he servo amplifier with 75% or less of the effective load ratio.

# (4) Power supply

r ower supply
(a) This converter unit and servo amplifier (drive unit) can be supplied from star-connected supply with earthed
neutral point of overvoltage category III set forth in EN 60664-1. However, when using the neutral point of 400V
system for 1-phase supply, a reinforced insulating transformer is required in the power input section.

(b) For the interface power supply, use a 24VDC power supply with reinforced insulation on I/O terminals.

(a) To prevent an electric shock, the protective earth (PE) terminal (marked  $\oplus$ ) of the converter unit, servo amplifier (drive unit) must be connected to the protective earth (PE) of the cabinet

(b) Do not connect two ground cables to the same protective earth (PE) terminal. Always connect cables to the



(c) If an earth leakage circuit breaker is used, always earth the protective earth (PE) terminal of the servo amplifier to prevent an electric shock.

## (6) Wiring and Installation

(a) The wires to be connected to the terminal block of the converter unit, servo amplifier (drive unit) must have the Wires to be connected to the terminal block of the converter unit, servo ampliner (a rrimping terminals provided with insulating tubes to prevent contact with adjacent terminal Crimping terminal Wire



(b) Use the servo motor side power supply connector which complies with the EN. The EN compliant power supply connector sets are available as options

(c) The converter unit and servo amplifier (drive unit) must be installed in the metal cabinet.

### (7) Peripheral devices, options

Use the molded case circuit breaker and magnetic contactor models which are EN compliant products given in the MR-J3: 

Servo Amplifier Instruction Manual.

Use a type B leakage current breaker (RCD). When it is not used, provide insulation between the servo amplifier and other device by double insulation or reinforced insulation, or install a transformer between the main power supply and servo amplifier and the device of the main power supply and servo amplifier (drive unit).

main power supply and serve ampliner (arrive unit).

(b) The sizes of the wires given in the MR-J3- Serve Amplifier Instruction Manual meet the following conditions. For use in any other conditions, follow Table 6 and Annex D EN 60204-1.

• Ambient temperature: 40°C (104°F)

• Sheath : PVC (polyvinyl chloride)

• Installation on wall surface or open cable tray

(c) Use the EMC filter for noise reduction.

### (8) Performing EMC tests

Performing EMC tests
When EMC tests are run on a machine/device into which the converter unit and servo amplifier (drive unit) has
been installed, it must conform to the electromagnetic compatibility (immunity/emission) standards after it has
satisfied the operating environment/electrical equipment specifications. For the other EMC directive guidelines
on the converter unit and servo amplifier (drive unit), refer to the EMC Installation Guidelines(IBNA)67310).
MR-J3 Series are not intended to be used on a low-voltage public network which supplies domestic premises;
radio frequency interference is expected if used on such a network. The installer shall provide a guide for
Installation and use, including recommended mitigation devices.

## 3. CONFORMANCE WITH UL/cUL STANDARD

This servo amplifier complies with UL 508C and CSA C22.2 No.14 standard. Refer to section 1.3 (2) for the servo amplifier model names described in the tables and figures

(1) Converter units, servo amplifiers (drive units) and servo motors used

	Servo motor									
Servo amplifier	HF-KP	HF-MP	HF-SP	HC-RP	HC-UP	HC-LP	HA-LP	HF-JP		
MR-J3-10□(1)	053 • 13	053 <b>1</b> 3								
MR-J3-20□(1)	23	23								
MR-J3-40□(1)	43	43								
MR-J3-60□			51 • 52			52		53		
MR-J3-70∐	73	73			72					
MR-J3-100□			81 • 102			102		73 • 103		
MR-J3-200□			121 901 152 202	103 • 153	152	152		153 • 203		
MR-J3-350□			301 ■ 352	203	202	202		353		
MR-J3-500□			421 <b>5</b> 02	353 <b>5</b> 03	352 502	302	502	503		
MR-J3-700□			702				601 701M 702	703		
MR-J3-11K□							801 12K1 11K1M 11K2	903 • 11K1 M		
MR-J3-15K□			/				15K1 15K1M	15K1M		

Servo amplifier	HF-SP	Servo motor HA-I P	HE-JP	П	Converter unit	Drive unit	Servo motor HA-I P
MR-J3-60□4	524	HA-LP	534	ł⊦			30K1 30K1M
MR-J3-100□4	1024		734 * 1034	H	MR-J3-CR55K	MR-J3-DU30K□	30K1 - 30K1M -
MR-J3-200 ☐ 4	1524 2024		1534 2034			MR-J3-DU37K□	37K1 37K1M
MR-J3-350∐4 MR-J3-500∐4	3524 5024		3534 5034	ł ⊦			37K2
MR-J3-700□4	7024	6014 • 701M4	7034	H		MR-J3-DU30K□4	25K14 = 30K14 = 30K1M4 = 30K24
MR-J3-11K□4		8014 19K14 11K1M4 11K24	9034 • 11K1M4		MR-J3-CR55K4	MR-J3-DU37K□4	37K14 37K1M4 37K24
MR-J3-15K□4		15K14 * 15K1M4 * 15K24	15K1M4		MR-93*CRooK4	MR-J3-DU45K□4	45K1M4 • 45K24
MR-J3-22K□4		20K14 • 22K1M4 • 22K24				MR-J3-DU55K□4	50K1M4 • 55K24

## (2) Installation

CAUTION

- The regenerative resistor supplied with 11kW to 22kW servo amplifiers does not have a protect cover. Touching the resistor (including wiring) screw hole area) may cause a burn injury and electric shock. Even if the power was shut-off, be careful until the bus voltage discharged and the temperature decreased because of the following reasons.
- It may cause a burn injury due to very high temperature without cooling. It may cause an electric shock due to charged capacitor of the servo amplifier.

The MR-J3 series have been approved as the products which have been installed in the electrical enclosure. The minimum enclosure size is based on 150% of each MR-J3 combination. And also, design the enclosure so that the ambient temperature in the enclosure is 50% (Cl31 $^{4}$ ) or less. The servo amplifier must installed in the metal cabinet. For environment, the units should be used in open type (UL 50) and overvoltage category III or lower. The converter unit and servo amplifier (drive unit) need to be installed at or below of pollution degree 2. For connection, use copper wires.

(3) Short-circuit current rating (SCCR) Suitable For Use On A Circuit Capable Of Delivering Not More Than 100 kA rms Symmetrical Amperes, 500 Volts

## (4) Flange

Mount the servo motor on a flange which has the following size or produces an equivalent or higher heat

Flange size				Servo motor			
[mm]	HF-MP HF-KP	HF-SP	HC-RP	HC-UP	HC-LP	HA-LP	HF-JP
$250 \times 250 \times 6$	053 • 13 • 23						
$^{250 \times 250 \times 12}$	43	51 81 52(4) to 152(4)	103 to 203	/	52 to 152		53(4) to 203(4)
$300 \times 300 \times 12$	73						
$_{300}\times_{300}\times_{20}$		121 • 201 202(4) • 352(4)			202 = 302		
550×550×30			353 <b>5</b> 03	72 • 152			353(4) 503(4)
650×650×35		301 = 421 502(4) = 702(4)		202 to 502		601(4) to 12K1(4) 701M(4) to 15K1M(4) 502 to 22K2 11K24 to 22K24	703(4) 902(4) 11K1M(4) 15K1M4(4)
950×950×35						15K1(4) to 37K1(4) 22K1M to 37K1M 22K1M4 to 50K1M4 30K2 37K2 30K24 to 55K24	

(5) About wiring protection
For installation in United States, branch circuit protection must be provided, in accordance with the National Electrical Code and any applicable local codes.
For installation in Canada, branch circuit protection must be provided, in accordance with the Canada Electrical Code and any applicable provincial codes.

(6) Options, peripheral devices
Use the UL/eUL Standard compliant products.
Use the UL/eUL Standard compliant products.
Use the UL/eUL Standard compliant products.

	o amplifier	Molded case circui			use	
(converter	unit · drive unit)	Current	Voltage AC [V]	Current [A]	Voltage AC [V	
MR-J3·10□(1) • 20	)[	50A frame 5A		10		
MR-J3-40□ • 20□		50A frame 10A		15		
MR-J3-60□ to 100	<b>□ •</b> 40 <b>□</b> 1	50A frame 15A		20		
MR-J3-200□		50A frame 20A		40		
MR-J3-350□		50A frame 30A		70		
MR-J3-500□		50A frame 50A	240	125	300	
MR-J3-700□		100A frame 75A	240	150	300	
MR-J3-11K⊔		100A frame 100A		200	1	
MR-J3-15K∐		225A frame 125A		250	1	
MR-J3-22K∐∐		225A frame 175A		350		
MR-J3-CR55K	MR-J3-DU30K□	400A frame 250A		500		
MK-93-CROOK	MR-J3-DU37K	400A frame 300A		600		
MR-J3-60∐4		50A frame 5A		10		
MR-J3-100⊔4		50A frame 10A		15	1	
MR-J3-200□4		50A frame 15A		25	1	
MR-J3-350□4		50A frame 20A		35		
MR-J3-500□4		50A frame 30A		50		
MR-J3-700□4		50A frame 40A	600Y/347	65	600	
MR-J3-11K∐4		60A frame 60A	6001/347	100	600	
MR-J3-15K∐4		100A frame 75A		150		
MR-J3-22K∐4		225A frame 125A		175		
	MR-J3-DU30K□4	225A frame 125A		250		
MR-J3-CR55K4	MR-J3-DU37K□4	225A frame 150A		300		
MR-99-CR99K4	MR-J3-DU45K⊔4	225A frame 175A		400		
	MR-J3-DU55K□4	400A frame 225A		450	1	

# (7) Capacitor discharge time

e is as follows. To ensure safety, do not touch the charging section for 15 minutes (20

innutes in case unive unit is sock of more, after power on.								
Servo amplifier (drive unit)	Discharge time (min)	Servo amplifier (drive unit)	Discharge time (min)					
MR-J3-10□ ■ 20□	1	MR-J3-350□4 500□(4) 700□(4)	10					
MR-J3-40□ ■ 60□(4) ■ 10□1 ■ 20□1	2	MR-J3-11K□(4)	4					
MR-J3-70□	3	MR-J3-15K□(4)	6					
MR-J3-40□1	4	MR-J3-22K□(4)	8					
MR-J3-100⊔(4)	5	MR-J3-DU30K□ DU37K□ DU30K□4	20					
MR-J3-200∐(4) ■ 350∐	9	DU37K□4 DU45K□4 DU55K□4	20					

(8) Selection example of wires
To comply with the UL/eUL Standard, use UL approved copper wires rated at 60/75°C (140/167°F) for wiring.
The following table shows the stranded wire sizes [AWG] and the crimping terminal symbols rated at 60°C (140°F). The sizes and the symbols rated at 75°C (167°F) are shown in the brackets.

Servo amplifier	Converter		(Note 3) Strand	led wires [AWG]	
(drive unit)	unit	L <sub>1</sub> L <sub>2</sub> L <sub>3</sub> ⊕	L <sub>11</sub> • L <sub>21</sub>	U V W P₁ P₂ ⊕	P • P <sub>2</sub> • C
MR-J <sup>2</sup> -10□(1) to 40□(1) 60□ 70□ MR-J <sup>3</sup> -100□ 200□		14(14)	16(16)	(Note 4)14(14)	14(14)
MR-J3-350		12(12)		12(12)	
(Note 1) MR-J3-500□	<b>\</b>	10(10): a(a)	16(16): h(h)	10(10): a(a)	14(14): g(g)
(Note 1) MR-J3-700□	1 \	8(8): b(b)	16(16): II(II)	8(8): b(b)	12(12): a(a)
(Note 1) MR-J3-11K□	1	6(6): c(c)		4(4): d(c)	10(10): j(j)
(Note 1) MR-J3-15K□	1	4(4): d(d)	16(16): g(g)	2(3): e(d)	
(Note 1) MR-J3-22K□		1/0(1): f(p)		-(1): -(p)	10(10): k(k)
(Note 1) MR-J3-DU30K	MR-J3-	-(1): -(t)	14(14)	-(2/0): -(u)	10(10): r(r)
(Note 1) MR-J3-DU37K□	CR55K	-(2/0): -(u)			
MR-J3-60□4	Λ				
MR-J3-100⊔4		14(14)	16(16)	14(14)	14(14)
MR-J3-200 4		4.1/4.1/2. / \		44(44). (1)	
MR-J3-350LJ4		14(14): g(g)	40(40):1(1)	14(14): g(g)	4 (4 () ( )
(Note 1) MR-J3-500 ☐ 4 (Note 1) MR-J3-700 ☐ 4	\	10(12): a(a)	16(16): h(h)	10(12): a(a) 10(10): a(a)	14(14): g(g)
(Note 1) MR-J3-700 4 (Note 1) MR-J3-11K 4	\	8(10): I(i)		10(10): a(a) 8(8): 1(1)	12(12): j(j)
(Note 1) MR-J3-11KLL4	\	6(8): c(I)	16(16): g(g)	8(8): I(I) 4(6): d(c)	10(10): j(j)
(Note 1) MR-J3-22K□4	\	6(6): m(m)	16(16)- g(g)	4(6): n(m)	10(10): k(k)
(Note 1) MR-J3-DU30K□4	,	3(4): s(s)		2(3): p(n)	10(10)- K(K)
(Note 1) MR-J3-DU37K□4	MR-J3-	2(2): t(s)		1(2): p(n)	
(Note 1) MR-J3-DU45KLL4	CR55K4		14(14)		10(10): r(r)
(Note 1) MR-J3-DU55K□4		-(2): (t)		-(1/0): -(t)	
, ,	•			•	
O	0		Ctronded wires [AM/C		

(drive unit)	Servo amplifier	Converter		Stranded wires [AWG	
MR-33-700U ■ 200U MR-33-500U (Note 1) MR-33-500U (Note 1) MR-33-500U (Note 1) MR-33-700U (Note 1) MR-33-700U (Note 1) MR-33-700U (Note 1) MR-33-15KU (Note 1) MR-33-15KU (Note 1) MR-33-103KU (Note 1) MR-33-700U (MR-33-700U		unit	B1 • B2	BU BV BW	OHS1 • OHS2
MR-33-700U ■ 200U MR-33-500U (Note 1) MR-33-500U (Note 1) MR-33-500U (Note 1) MR-33-700U (Note 1) MR-33-700U (Note 1) MR-33-700U (Note 1) MR-33-15KU (Note 1) MR-33-15KU (Note 1) MR-33-103KU (Note 1) MR-33-700U (MR-33-700U	MR-12-10□(1) to 40□(1)	\			
MR-33-360L  (Note 1) MR-33-900L  (Note 1) MR-33-1KL  (Note 1) MR-33-1KL  (Note 1) MR-33-1KS, (Note 1) MR-33-1KS, (Note 1) MR-33-1KS, (Note 1) MR-33-91C30K  (Note 1) MR-33-90L3K  (Note 1) MR-33-90L3K  (Note 1) MR-33-90L4  (Note 1) MR-33-90L3KL4  (Note 1) MR-33-90L4KL4  (Note 1) MR-33-90L4K	60L • 70L	1 \			
(Note 1) MR-33-500L  (Note 1) MR-33-500L  (Note 1) MR-33-700C  (Note 1) MR-33-71KL  (Note 1) MR-33-15KL  (Note 1) MR-33-15KL  (Note 1) MR-33-22KL  (Note 1) MR-33-22KL  (Note 1) MR-33-50L34 MR-33-50L4 MR-33-50L55KL4 Note 1) MR-33-50L4 MR-33-50L4 MR-33-50L55KL4 Note 1) MR-33-50L45KL4 MR-33-60L4 MR-33-50L55KL4 Note 1) MR-33-50L45KL4 MR-33-60L4 MR-33-50L55KL4 Note 1) MR-33-50L45KL4 Note 1) MR-33-50L		1 \			
Note 1) MR-33-700		\	10(10)		
(Note 1) MR-33-11KL    (Note 1) MR-33-15KL    (Note 1) MR-33-15KL    (Note 1) MR-33-15KL    (Note 1) MR-33-15KL    (Note 1) MR-33-DU37KL    (Note 1) MR-33-DU37KL    (Note 1) MR-33-DU37KL    (Note 1) MR-33-DU37KL    (Note 1) MR-33-00LJ4   (Note 1) MR-33-11KLJ4   (Note 1) MR-33-DU37KLJ4   (Note 1) MR-33-		- \	16(16)	(NI=4= 0)	(1)-4- (1)
Red   MR-33-15KL	(Note 1) MR-J3-700□	\		(Note 2) 14(14)	(Note 2) 16(16)
Note   1 MR-33-22KL	(Note 1) MR-J3-11K⊔	<b>\</b>			
Note 1   MR-33-DU30RL	(Note 1) MR-J3-15K□	1 \			
RNote 1 MR-33-DU37RL		\		14(14)	16(16)
MR-33-90LJ4		MR-J3-			
MR-33-700U4 MR-33-350U4 (Note 1) MR-33-500U4 (Note 1) MR-33-700U4 (Note 1) MR-33-700U4 (Note 1) MR-33-700U4 (Note 1) MR-33-71KU4 (Note 1) MR-33-71KU4 (Note 1) MR-33-72KU4 (Note 1) MR-33-72KU4 (Note 1) MR-33-700U3KU4 (Note 1) MR-33-700U3KU4 (Note 1) MR-33-700U3KU4 (Note 1) MR-33-70U3KU4 (Note 2) MR-33-70U3KU4 (Note 2) MR-33-70U3KU4 (Note 2) MR-33-70U3KU4 (Note 2) MR-33-70U3KU4 (Note 3) MR-33-70U3KU4 (Note 3) MR-33-70U3KU4 (Note 3) MR-33-70U3KU4 (Note 3) MR-33-70U3KU4 (Note 4) MR-33-70U3KU4 (Note 3) MR-33-70U3KU4 (Note 4) MR-33-70U3KU4 (Note 4) MR-33-70U3KU4 (Note 5) MR		CR55K			
MR-33-200-U4 (Note 1) MR-33-500-U4 (Note 1) MR-33-500-U4 (Note 1) MR-33-500-U4 (Note 1) MR-33-700-U4 (Note 1) MR-33-11K-U4 (Note 1) MR-33-11U37K-U4 (Note 1) MR-33-1U37K-U4 (Note 1) MR-33-1U37K-U4 (Note 1) MR-33-1U37K-U4 (Note 1) MR-33-1U45K-U4 (Note 2) MR-33-1U45K-U4 (Note 3) M		<b>\</b>		/	
MR-33-360U4 (Note 1) MR-33-600U4 (Note 1) MR-33-760U4 (Note 1) MR-33-760U4 (Note 1) MR-33-760U4 (Note 1) MR-33-11KU4 (Note 1) MR-33-11KU4 (Note 1) MR-33-22KU4 (Note 1) MR-33-22KU4 (Note 1) MR-33-22KU4 (Note 1) MR-33-20KU4 (Note 1) MR-33-0U37KU4 (Note 1) MR-33-0U37KU4 (Note 1) MR-33-0U37KU4 (Note 1) MR-33-0U45KU4 (Note 1	MR-J3-100⊔4	1 /			
(Note 1) MR-33-500_14		1 \			
Note 1) MR-33-700		1 \			
(Note 1) MR-33**** (NOL4   (Note 1) MR-33*** (NOL4   (NOL4 1) MR-33***		1 \	16(16)	(NI-4- (N)	Alete (N
(Note 1) MR-33-11KU4   (Note 1) MR-33-15KU4   (Note 1) MR-33-22KU4   (Note 1) MR-33-22KU4   (Note 1) MR-33-22KU4   (Note 1) MR-33-20U37KU4   (Note 1) MR-33-2U45KU4   (No	(Note 1) MR-J3-700□4	\			
Note 1 MR-33-15KL4     Note 1 MR-32-2KL4     Note 1 MR-32-2KL4     Note 1 MR-33-DU30KL4     Note 1 MR-33-DU37KL4     Note 1 MR-33-DU37KL4     Note 1 MR-33-DU35KL4     Note 1 To connect these models to a terminal block, be sure to use the screws that come with the terminal block.	(Note 1) MR-J3-11K 4	1 \			
Note 1 MR-33-DU30KL1	(Note 1) MR-J3-15K□4	1 \		14(14)	
Note 1) MR-33-DU37KL14   MR-33-CR55K4   MR-33-CR55K4   MR-33-DU45KL14   (Note 1) MR-33-DU55KL14   (R0te 1) MR-33-DU55KL14   (Note 1) MR-33-DU55KL14   (Note 1) MR-33-DU55KL14   (Note 1) MR-33-DU55KL14   (Note 1) MR-33-DU45KL14   (Note 1) MR-33-DU45KL1		1 \	l		
(Note 1) MR-J3-DU45KU4 CR55K4 (Note 1) MR-J3-DU55KU4 (Note 1) MR-J3-DU55KU4 (Note 1) CR55K4 (N					16(16)
(Note 1) MR-J3-DU45KLI4 CR55K4 (Note 1) MR-J3-DU55KLI4 Vote 1. To connect these models to a terminal block, be sure to use the screws that come with the terminal block.				16(16)	
Note 1. To connect these models to a terminal block, be sure to use the screws that come with the terminal block.		CR55K4		10(10)	
			re to use the screws tha	t come with the termina	l block.

2. To wire the servor will a scoring rail.

3. Alphabets in the table indicate crimping tools. Refer to the following table for the crimping terminals and crimping tools.

4. To wire the servo amplifier and a HF-MP • KP servo motor, use the MR-PWS1CBL (option). To extend the wiring, use the AWG14 wire size.

### Table: Recommended crimping terminals

		Ser	vo amplifier side crimpir Applicable tool	ng terminals	
Symbol	(Note 2)		Manufacture		
	Crimping terminal	Body	Head	Dice	ivialidiacture
a	FVD5.5-4	YNT-1210S	/		
(Note 1) b	8-4NS	YHT-8S	_	_	
С	FVD14·6	YF-1 = E-4	YNE-38	DH-112 BH-122	
D	FVD22*6	11.1 - 1.4	11VE-90	DH-113 • DH-123	
(Note 1) e	38-6	YPT-60-21		TD-112 TD-124	
	90.0	YF-1 E-4	YET-60-1	1D-112 - 1D-124	
(Note 1) f	R60-8	YPT-60-21		TD-113 TD-125	
		YF-1 E-4	YET-60-1	1D 113 1D 123	
G	FVD2-4	YNT-1614	/		
H	FVD2-M3	1141 1014	$\dashv$		
J	FVD5.5-6	YNT-1210S			
K	FVD5.5-8	1111 12100	`		JST
L	FVD8-6		F-1 • E-4 YNE-38	DH-111 DH-121	951
M	FVD14-8	YF-1 E-4		DH-112 ■ DH-122	
N	FVD22*8			DH-113 DH-123	
(Note 1) p	R38-8	YPT-60-21		TD-112 TD-124	
		YF-1 • E-4	YET-60-1	15 112 15 154	
Q	FVD2-6	YNT-1614	_		
R	FVD5.5-10	YNT-1210S	/		
S	FVD22-10	YF-1 • E-4	YNE-38	DH113 • DH-123	
(Note 1) t	R38-10	YPT- 60-21		TD-112 TD-124	
		YF-1 • E-4	YET-60-1	15 151	
(Note 1) u	R60-10	YPT-60-21		TD-113 TD-125	
		YF-1 • E-4	YET-60-1	110 110 110 120	

Note 1. Coat the part of crimping with the insulation tube.

2. Some crimping terminals may not be mounted depending on the size. Make sure to use the recommended ones or equivalent ones.

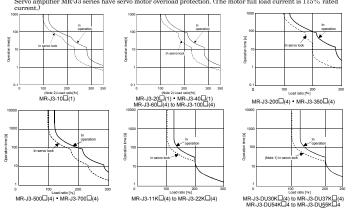
# (9) Terminal tightening torque

Servo amplifier	Tightening torque [N ■ m]								
Gervo arripililei	L <sub>1</sub> L <sub>2</sub> L <sub>3</sub> N P <sub>1</sub> P <sub>2</sub>	P C	L <sub>11</sub> L <sub>21</sub>	U V W	PE				
MR-J3-10□ (1) ± <sub>0</sub> 40□(1) = 30□ ± <sub>0</sub> 100□ = 60□4 = 100□4 = 200□(4)			_		1.0				
MR-J3-200∐-RT ■ 350∐	0.6			0.6	1.2				
MR-J3-350□4 = 500□(4) = 700□(4)	1.2		0.8	1.2					
MR-J3-11K□(4) ■ 15K□(4)	3.0	3.0	1.2	3.0					
MR-J3-22K□(4)	6.0	6.0	1.2	6.0					

Drive unit	1				_	Γightenir	ng torque	e [N = n	n]				
Converter unit	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	P <sub>1</sub>	С	L+	L-	L <sub>11</sub>	L <sub>21</sub>	U	V	W	PE
MR-J3-DU30K□ = DU37K□ DU45K□4 = DU55K□4		/	_			3	3.0	1	2		1	2.0	
MR-J3-DU30K□4 • DU37K□4				J					-	3.0			
MR-J3-CR55K(4)			12.0			1		1			_		12.0

# (10) Overload protection characteristics

An electronic thermal relay is built in the servo amplifier to protect the servo motor, converter unit, servo amplifier (drive unit) and servo motor power line from overloads. The operation characteristics of the electronic thermal relay are shown below. It is recommended to use an unbalanced torque generated machine, such as a vertical motion sha so that unbalanced torque is not more than 70% of the rate to 45°C 82°C. When you carry out adhesion mounting of the servo amplifier, make circumference temperature into 0 45°C 82°C. e. blifier MR\*J3 series have servo motor overload protection. (The motor full load current is 115% rated



Note 1. The thermal relay protection characteristics for servo lock are not applied to MR-J3-CR55K(4).

2. The operation time at the load ratio of 300 to 350% applies when the maximum torque of HF-KP servo motor is incr

### (11) Over-temperature protection for motor

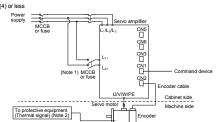
Motor Over temperature sensing is not provided by the drive

Integral thermal protection(s) is necessary for motor and refer to chapter 3 (12) for the proper connection.

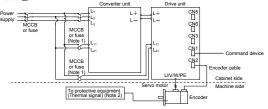
### (12) Figure configuration

ntative configuration example to conform to the UL/cUL standard is shown below. The earth wiring is excluded from the figure configuration





(b) MR-J3-DU30K ☐ or more



Note 1. When the wire sizes of  $L_1$  and  $L_{11}$  are the same, MCCB or fuse is not required 2. Please use a thermal sensor, etc. for thermal protection of the servo motor.

The control circuit connectors described by rectangles are safely separated from the main circuits described by

# 4. SOUTH KOREA COMPLIANCE

olies with the Radio Wave Law (KC mark). Please note the following to use the product

기기는 업무용 (A급) 전자파적합기기로서 판 매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 l용하는 것을 목적으 로 합니다.

(The product is for business use (Class A) and meets the electromagnetic compatibility requirements. The seller and the user must note the above point, and use the product in a place except for home.)

# 5. INSPECTION

**⚠** WARNING

- Before starting maintenance and/or inspection, turn off the power and wait 15 minutes or more (wait more than 20 minutes in the case of the drive unit is 30kW or more) until the charge lamp goes off. Then, confirm the voltage between P(+) and N(-) (between L+ and L- in the case of the drive unit is 30kW or more) is safe with a voltage tester and others to prevent an electric shock. In addition, always confirm from the front of the servo amplifier (converter unit), whether the charge lamp is off or not.

  To avoid the risk of electric shock, only qualified personnel should
- attempt inspections. For repair and parts replacement, contact your local sales office. Do not perform insulation resistance test on the servo amplifier (drive



unit) as damage may result. Do not disassemble and/or repair the equipment on customer side

- (1) Inspection mended to make the following checks periodically
- (a) Check for loose terminal block screws. Retighten any loose screws
- (b) Check the cables and the like for scratches and cracks. Perform periodic inspection according to operating
- (c) Check that the connector is securely connected to the servo amplifier
- (d) Check that the wires are not coming out from the connector (e) Check for dust accumulation on the servo amplifier

parts replacement, please contact your sales representate

The following parts must be changed periodically as listed below. If any part is found faulty, it must be changed immediately even when it has not yet reached the end of its life, which depends on the operating method and

r use in the atmosphere having much oil mist, dust, etc., clean and inspect every three months

	Part name	Standard life					
	Smoothing capacitor	10 years					
Converter unit and Servo amplifier	Relay	Number of power on and number of emergency stop times: 100,000 times					
(drive unit)	Cooling fan	10,000 to 30,000 hours (2 to 3 years)					
(drive dillo	Absolute position battery	Refer to the MR:J3: Servo Amplifier Instruction Manual					

# (a) Smoothing capacitor

Affected by ripple currents, etc. and deteriorates in characteristic. The life of the capacitor greatly depends or ature and operating conditions. The capacitor will reach the end of its life in 10 years of continuous mal air-conditioned environment (Surrounding air temperature of  $40^{\circ}\text{C}$  ( $104^{\circ}\text{F}$ ) or less.).

acts will wear due to switching currents and contact faults occur. Relays reach the end of their life

(c) Converter unit and servo amplifier (drive unit) cooling fan

The cooling fan bearings reach the end of their life in 10,000 to 30,000 hours. Normally, therefore, the fan
must be changed in a few years of continuous operation as a guideline.

It must also be changed if unusual noise or vibration is found during inspection.

# 6. ALARMS AND WARNINGS

For details on each type of alarms or warnings, refer to each servo amplifier technical instruction

### Safety Instructions

Please read the instructions carefully before using the equipment.

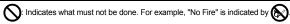
Install, and peruse all this guide and attached documents before the drive and maintenance and the check. After that, use these correctly. Use it after it is skilled of the knowledge of the equipment, information on safety, and all of notes. In this guide, the safety instruction levels are classified into "WARNING" and "CAUTION".

**MARNING ∴**CAUTION

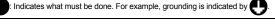
Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

Indicates that incorrect handling may cause hazardous conditions, resulting ir medium or slight injury to personnel or may cause

Note that the CAUTION level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel safety. What must not be done and what must be done are indicated by the following diagrammatic symbols.



physical damage.



1. To prevent electric shock, note the following

# 

In this guide, instructions at a lower level than the above, instructions for other functions, and so on are

into "POINT". After reading this guide, always keep it accessible to the operato

- Before wiring or inspection, turn off the power and wait 15 minutes or more (wait more than 20 minutes in the case of the drive unit is 30kW or more) until the charge lamp goes off. Then confirm the voltage between P(+) and N(-) (between L+ and L- in the case of the drive unit is 30kW or more) is safe with a voltage tester and others to prevent an electric shock. In addition, always confirm from the front of the servo amplifier (converter unit), whether the charge lamp is off or not.
- Connect the converter unit and servo amplifier (drive unit) and servo motor to ground
- Any person who is involved in wiring and inspection should be fully competent to do the work. Do not attempt to wire the converter unit and servo amplifier (drive unit) and servo motor until
- they have been installed. Otherwise, it may cause an electric shock.
- Operate the switches with dry hand to prevent an electric shock.
- The cables should not be damaged, stressed loaded, or pinched. Otherwise, it may cause ar
- During power-on or operation, do not open the front cover. Otherwise, it may cause an electric Do not operate the converter unit and servo amplifier (drive unit) with the front cover removed
- High-voltage terminals and charging area are exposed and it may cause an electric shock.
- Except for wiring or periodic inspection, do not remove the front cover even if the power is off The converter unit and servo amplifier (drive unit) are charged and it may cause an electric shock
- To prevent an electric shock, always connect the protective earth (PE) terminal (marked 🕀) of the converter unit and servo amplifier (drive unit) to the protective earth (PE) of the cabinet. When using a residual current device (RCD), select type B.
- To avoid an electric shock, insulate the connections of the power supply terminals
- 2. To prevent fire, note the following

# ⚠ CAUTION

- Install the converter unit and serve amplifier (drive unit), serve motor and regenerative resistor on incombustible material. Installing them directly or close to combustibles will lead to smoke or
- Always connect a magnetic contactor between the main circuit power supply and L<sub>1</sub>, L<sub>2</sub>, and L<sub>3</sub> of the converter unit, servo amplifier, and configure the wiring to be able to shut down the power supply on the side of the converter unit, servo amplifier's power supply. If a magnetic contactor is not connected, continuous flow of a large current may cause smoke or a fire when the converte unit or servo amplifier (drive unit) malfunctions.
- Always connect a molded-case circuit breaker, or a fuse to each servo amplifier between the power supply and the main circuit power supply (L1, L2, and L3) of the servo amplifier (including converter unit), in order to configure a circuit that shuts down the power supply on the side of the servo amplifier's power supply. If a molded-case circuit breaker or fuse is not connected continuous flow of a large current may cause smoke or a fire when the servo amplifie
- When a regenerative resistor is used, use an alarm signal to switch main power off. Otherwise, a regenerative transistor malfunction or the like may overheat the regenerative resistor, causing smoke or a fire.
- Provide adequate protection to prevent screws and other conductive matter, oil and other combustible matter from entering the converter unit, servo amplifier (drive unit) and servo motor.

## 3. To prevent injury, note the following

# 

- Only the voltage specified in the instruction manual should be applied to each terminal Otherwise, a burst, damage, etc. may occur.
- Connect the terminals correctly to prevent a burst, damage, etc.

  Ensure that polarity (+, -) is correct. Otherwise, a burst, damage, etc. may occur.
- Take safety measures, e.g. provide covers, to prevent accidental contact of hands and parts (cables, etc.) with the converter unit and servo amplifier (drive unit) heat sink, regenerative resistor, servo motor, etc. since they may be hot while power is on or for some time after power-off. Their temperatures may be high and you may get burnt or a parts may damaged.
- During operation, never touch the rotating parts of the servo motor. Otherwise, it may cause injury.

# 4. Additional instructions

The following instructions should also be fully noted. Incorrect handling may cause a fault, injury, electric shock, fire, etc.

(1) Transportation and installation

# ♠ CAUTION

- Transport the products correctly according to their mass
- Stacking in excess of the specified number of products is not allowed
- Do not carry the servo motor by holding the cables, shaft, encoder or connector. Do not hold the front cover to transport the converter unit and serve amplifier (drive unit). The
- converter unit and servo amplifier (drive unit) may drop. Install the converter unit and servo amplifier (drive unit) in a load-bearing place in accordance
- with the instruction manual. Do not get on or put heavy load on the equipment
- The converter unit, servo amplifier (drive unit) and servo motor must be installed in the specified direction
- Leave specified clearances between the converter unit, servo amplifier (drive unit) and control enclosure walls or other equipment.
- Do not install or operate the converter unit, servo amplifier (drive unit) and servo motor which has been damaged or has any parts missing.

### ∴ CAUTION

- Do not block the intake and exhaust areas of the converter unit, servo amplifier (drive unit) and servo motor with a cooling fan. Otherwise, it may cause a malfunction
- Do not drop or strike converter unit, servo amplifier (drive unit) and servo motor, Isolate from a
- impact loads.

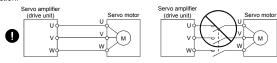
  When storing or using the converter unit, servo amplifier (drive unit) and servo motor, comply with
- the environmental conditions given in the Servo Amplifier Instruction Manual and Servo Motor Instruction Manual curely attach the servo motor to the machine. If attach insecurely, the servo motor may con
- off during operation. The servo motor with reduction gear must be installed in the specified direction to prevent of
- leakage.
  Take safety measures, e.g. provide covers, to prevent accidental access to the rotating parts of
- the servo motor during operation.

  Never hit the servo motor or shaft, especially when coupling the servo motor to the machine servo motor.
- Otherwise, the encoder may malfunction.
- Do not subject the servo motor shaft to more than the permissible load. Otherwise, the shaft may
- When the equipment has been stored for an extended period of time, contact your local sales
- When treating the converter unit and servo amplifier (drive unit) be careful about the edged part such as the corners of the converter unit and servo amplifier (drive unit).
- The converter unit and servo amplifier (drive unit) must be installed in the metal cabinet When fumigants that contain halogen materials such as fluorine, chlorine, bromine, and jodine
- are used for disinfecting and protecting wooden packaging from insects, they cause malfunction when entering our products. Please take necessary precautions to ensure that remaining materials from fumigant do not enter our products, or treat packaging with methods other than rumigation (heat method). Additionally, disinfect and protect wood from insects before packing

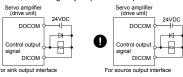
# 

- Wire the equipment correctly and securely. Otherwise, the servo motor may operate
- Do not install a power capacitor, surge killer or radio noise filter (FR-BIF (-H) option) between the
- servo motor and servo amplifier (drive unit). Connect the servo amplifier (drive unit) power output (U, V, and W) to the servo motor power
- input (U, V, and W) directly. Not doing so may cause unexpected operation.

  Connect the servo motor power terminal (U, V, W) to the servo motor power input terminal (U, V, W) to the servo motor po W) directly. Do not let a magnetic contactor, etc. intervene. Otherwise, it may cause a



Do not connect AC power directly to the servo motor. Otherwise, it may cause a malfunction The surge absorbing diode installed to the DC relay for control output should be fitted in the specified direction. Otherwise, the emergency stop and other protective circuits may not operate



 When the cable is not tightened enough to the terminal block (connector), the cable or terminal block (connector) may generate heat because of the poor contact. Be sure to tighten the cable with specified torque.

# 

- Before operation, check the parameter settings. Improper settings may cause some machines to perform unexpected operation
- The parameter settings must not be changed excessively. Operation will be instable

# (4) Usage

# 

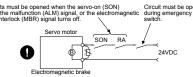
- Provide an external emergency stop circuit to ensure that operation can be stopped and powe
- Any person who is involved in disassembly and repair should be fully competent to do the work Before resetting an alarm, make sure that the run signal of the servo amplifier (drive unit) is off to prevent an accident. A sudden restart is made if an alarm is reset with the run signal on.
- Do not modify the equipment. Use a noise filter etc. to minimize the influence of electromagnetic interference, which may be
- caused by electronic equipment used near the servo amplifier (drive unit).

  Use the converter unit and servo amplifier (drive unit) with the specified servo motor
- The electromagnetic brake on the servo motor is designed to hold the motor shaft and should not
- be used for ordinary braking.
  For such reasons as service life and mechanical structure (e.g. where a ball screw and the servo motor are coupled via a timing belt), the electromagnetic brake may not hold the motor shaft. To
- ensure safety, install a stopper on the machine side. Burning or breaking a converter unit and servo amplifier (drive unit) may cause a toxic gas. Do not burn or break a converter unit and servo amplifier (drive unit).

### (5) Corrective actions

# **⚠** CAUTION

- When it is assumed that a hazardous condition may take place at the occur due to a power failure or a product fault, use a servo motor with electromagnetic brake or an external brake mechanism
- Configure a circuit so that the electromagnetic brake activates with the external emergency stop switch at the same time.



- When any alarm has occurred, eliminate its cause, ensure safety, and deactivate the alarm before restarting operation.
- Design the machine in order to avoid sudden restarting in case of after an instantaneous power

(6) Maintenance, inspection and parts replacement

### 

- With age, the electrolytic capacitor of the converter unit and servo amplifier (drive unit) will deteriorate. To prevent a secondary accident due to a fault, it is recommended to replace the electrolytic capacitor every 10 years when used in general environment. Please contact your local
- When using a converter unit and servo amplifier (drive unit) whose power has not been turned on for a long time, contact your local sales office.

### (7) General instruction

• To illustrate details, the equipment in the diagrams of this guide and instruction manual may have been drawn without covers and safety guards. When the equipment is operated, the covers and safety guards must be installed as specified. Operation must be performed in accordance with this guide and instruction manual.

Please dispose a converter unit, servo amplifier (drive unit), battery (primary battery) and other options according to your local laws and regulations.

The number of write times to the EEP-ROM, which stores parameter settings, etc., is limited to 100,000. If the total number of the following operations exceeds 100,000, the servo amplifier and/or converter unit may fail when the EEP-ROM reaches the end of its useful life.

- Writing to the EEP-ROM due to parameter setting changes

## Battery transportation

MR-J3BAT contains a lithium metal battery, ER6. MR-J3BAT is not subject to the dangerous goods

To transport lithium metal batteries and lithium metal batteries contained in equipment by means of

For more information, contact your local sales office.

### Warranty

1. Warranty period and coverage

We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as th "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distribute from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatchin our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not resj or any on-site readjustment and/or trial run that may be required after a defective unit are repaired or replace ries. We are not responsible

# lesignated by you or eighteen (18) months`from the date of manuracture whichever comes first ("Warranty Peri Varranty period for repaired Product cannot exceed beyond the original warranty period before any repair work

- our service company upon your request and the actual cost will be charged ever, it will not be charged if we are responsible for the cause of the failure.
- terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.
- and the caution label affixed to the Product.

  (3) Even during the term of warranty, the repair cost will be charged on you in the following cases;
  (3): a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem

  (ii): a failure caused by any alteration, etc. to the Product made on your side without our approval

  (iii): a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry.

  (iv): a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced.

  (v): any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
- a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and
- 2. Term of warranty after the stop of production

Whether under or after the term of warranty, we assume no responsibility for any damages arisen from causes for which we are not responsible, any losses of opportunity and/or profit incurred by you due to a failure of the Product any damages, secondary damages or compensation for accidents arisen under a specific circumstance that are foreseen or unforeseen by our company, any damages to products other than the Product, and also compensation for any replacement work, readjustment, start-up test run of local machines and the Product and any other operations conducted by you.

5. Change of Product specifications Specifications listed in our catalogs, manuals or technical documents may be changed without notice

Application and use of the Product (i) For the use of our General-Purpose AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in General-Purpose AC Servo, and a backup or fail-safe function should operate on an external system to General-Purpose AC Servo when any failure or malfunction occurs.

2) Our General-Purpose AC Servo is designed and manufactured as a general purpose product for use at genera industries.

Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used.

In addition, applications which may be substantially influential to human lives or properties for such as airlines.

medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used. We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.

# ● DISPOSAL OF WASTE ●

▲ EEP-ROM life

- Home position setting in the absolute position detection system
- Writing to the EEP-ROM due to device changes

(Class 9) of the UN Recommendations

transport subject to the UN Recommendations, take actions to comply with the following regulations: the United Nations Recommendations on the Transport of Dangerous Goods, the Technical Instruction (ICAO-TI) by the International Civil Aviation Organization (ICAO), and the International Maritime Dangerous Goods Code (IMDG Code) by the International Maritime Organization (IMO). To transport the batteries, check the latest standards or the laws of the destination country and take

The term of warranty for Product is twelve (12) months after your purchase or delivery of the Product to a place

1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule. It can also be carried out by

2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the

re generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company

(viii) : any other failures which we are not responsible for or which you acknowledge we are not responsible for

1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued The announcement of the stop of production for each model can be seen in our Sales and Service, etc (2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA center for details